Stagnation-point flow and mass transfer with chemical reaction past a permeable stretching/shrinking sheet

ABSTRACT

An analysis is carried out to investigate the steady two-dimensional boundary layer stagnation point flow past a permeable stretching/shrinking sheet with chemical reaction. Using a similarity transformation, the governing equations are transformed into coupled, nonlinear ordinary differential equations which are then solved numerically using a shooting method. Effects of uniform suction and injection on the flow and mass transfer characteristics are thoroughly examined. Different from a stretching sheet, it is found that the solutions for a shrinking sheet are non-unique. The range of parameter b/a where the similarity solution exists for the steady stagnation point flow over a stretching/shrinking sheet with suction effect is larger compared with injection effect. The results indicate that the concentration boundary layer thickness decreases with increasing values of Schmidt number and reaction-rate parameter for both solutions.

Keyword: Chemical reaction; Mass transfer; Stagnation point flow; Stretching/shrinking; Suction/injection